Annual Index of Articles: 1988

ACID RAIN

Portland Cement—The Answer to Acid Rain?: Editorial describes how portland cement may be able to help reduce or alleviate acid rain. **2 pp; 88:30**

AGGREGATES

Aggregates Bring Lifetime Color to Concrete: Here is *Concrete Construction's* updated list of suppliers, colors, types of stone, and the leading uses of decorative aggregates. **4 pp; 88:571**

AIR ENTRAINMENT

Better Bubbles: A new modification of Cocamide DEA avoids the problems of reduced concrete strength and marked variations in air content by producing bubbles with thicker walls. **3 pp; 88:412**

BLEEDING

Concrete Bleeding: Bleeding is caused by aggregate and cement particles settling. The amount of bleeding depends on mix properties. Bleeding in deep sections and flatwork are discussed. **2 pp; 88:935**

BONDING

Bonding New Concrete to Old: Proper surface preparation, material choice and use, and curing are crucial or there may be total loss of bond. **3 pp; 88:676**

BRIDGES

Intercontinental Peace Bridge Could Join East and West: Construction proposal for building a bridge from Siberia to Alaska by going across the Bering Strait. **2 pp; 88:587**

What Makes a Bridge Beautiful?: Eleven speakers at ACI convention tell how aesthetics and costs relate to bridge work. Describes the Sunshine Skyway Bridge across Tampa Bay in Florida. **2 pp; 88:23**

CATHODIC PROTECTION

Improved Cathodic Protection System: Titanium mesh is the key to a new cathodic protection system that stops corrosion even in salt-contaminated concrete. It offers advantages of low weight, flexibility, multiple current paths, and thermal compatibility with concrete. **2 pp; 88:340**

COLD WEATHER CONCRETING

Use Curing Blankets to Offset Cold Weather Effects in Concrete: Insulated polypropylene foam curing blankets keep freshly placed concrete warm, permit work at −25° F. **2 pp; 88:1036**

COLORED CONCRETE

Getting Ahead with Colored Concrete: Properly used, colored concrete offers unlimited design possibilities and permanent low-maintenance beauty. Some dos and don'ts from manufacturers for best results with integral color, dry-shake color hardeners, and chemical stains. **5 pp; 88:853**

CONSTRUCTION METHODS

Concrete Girders Rolled into Place: A Texas general contractor rolled 92 110-foot girders into place on top of a wastewater treatment plant. He used rollers on a temporary steel runway and hydraulic jacks to pull the girders into place. **2 pp; 88:176**

COOLING CONCRETE

Cooled Concrete Controls Cracking for Base Mat Pour: To reduce cracking, design engineers required that temperature differences within a 6-foot-thick concrete mat be held to 30° F. Cooling the fresh concrete with liquid nitrogen helped achieve the goal. **2 pp; 88:1032**

CRACKING

Cracks in Structures: Every concrete building has cracks. Most cracking is insignificant, but some is a symptom of structural distress or defective concrete. Photographs show cracks and the author describes corrective action needed. **5 pp; 88:312**

D-cracking Pavements: Information from the National Cooperative Highway Research Program about the causes and symptoms of D-cracking and factors influencing D-cracking development. **2 pp; 88:845**

CURING

Making Good Concrete Even Better: Article discusses how long to cure concrete; the effect of temperature, methods, and materials; and the special precautions needed for vertical surfaces, colored concrete, and rough surfaces. **4 pp; 88:743**

DESIGN

How to Choose a Concrete Framing System: Article tells how to compare framing alternatives during preliminary design. Eight framing schemes are contrasted by span, advantages and disadvantages, and building type. **3 pp; 88:408**

EXCAVATION

Sinking Caisson Serves as Excavation and Permanent Support Structure: Using a sinking caisson for a holding pit for mill scale saved 9 weeks of construction time and 18% of original estimated costs. **2 pp; 88:107**

FIRE RESISTANCE

Cost-effective Fire Protection: Concrete-masonry construction lowers insurance costs and it improves fire safety. If a fire does occur, repair of a concrete-masonry structure is less costly. **3 pp; 88:481**

(more)

FLOORS

Trap Rock Aggregate for Floor Construction: How to use trap rock in concrete floors subjected to abrasive wear. **2 pp; 88:946**

FORMING

Formwork for Spiral Ramps at Dolphins' Stadium: Forming procedures for spiral ramps included use of fiber-reinforced plastic pans and flying shores. **4 pp; 88:1007**

How to Form Curved Walls: Article describes four ways to form curved walls: fixed-radius manufactured walers, fixed-radius job-built walers, adjustable radius walers, and modular form panels. **4 pp; 88:5**

Truck-mounted Crane Cuts Forming Time in Half, Saves Workers' Backs: Wall forms stacked vertically in cribs are lifted in and out of foundation excavation by a truck-mounted crane. Saves time and labor for a poured-wall contractor. **2 pp; 88:930**

FORMWORK

Rib-reinforced Expanded Steel Mesh Solves a Forming Problem: A leave-in-place concrete forming product enabled the contractors to place 12 inches of bedding aggregate and a 6-inch-thick concrete slab on a 1-to-1 slope. **2 pp; 88:839**

FURNITURE

Concrete Furniture: Beautiful concrete furniture is designed and built by Californian David Hertz using either conventional or lightweight concretes. He makes concrete bars, counter tops, and tables for businesses and residences. **2 pp; 88:50**

HIGH-RISE CONSTRUCTION

Cityspire Is New York's Tallest Reinforced Concrete: The 1987 CIB award winner at 810 feet tall is believed to be the slenderest structure among the world's 100 tallest buildings. Slabs 8½ to 10½ inches thick were used to reduce wind effects on the building. **3 pp; 88:486**

Concrete High-rises Offer Many Cost Advantages: Concrete buildings can be more economical to finance, construct, operate, and maintain than other structural systems. Tips for designing the most economical concrete frames are given. **3 pp; 88:453**

HIGH-STRENGTH CONCRETE

Resistance of High-strength Concrete to Freezing and Thawing: The National Cooperative Highway Research Program summarizes durability studies on high-strength concrete. **3 pp; 88:344**

HISTORY

Albert Kahn: Pioneer in Concrete Industrial Architecture: Kahn was one of the first men to use reinforced concrete for industrial architecture. In the 1900s he built innovative plants for Packard and Ford. During the steel shortages of World War II, he invented building methods that used no steel. **4 pp; 88:152**

Chicago's Underground Secret: 40-odd miles of unused concrete tunnel lie below downtown Chicago. A hundred years ago Illinois Telephone & Telegraph Co. ran an electric railway system through the tunnels. **2 pp; 88:512**

Concrete Tower Serves as a Landmark in West Suburban Chicago for Almost 80 Years: In 1908, a Hofmann tower in Lyons, Illinois, was built to look like a 5th-century European strong tower. It is on the Illinois and the National Register of Historic Places and will be restored. **2 pp; 88:208**

Record-diameter Prestressed, Precast Pipe: Moving 1.2 million acre feet of water from the Colorado River through Arizona required the largest water transportation system ever authorized by the U.S. Congress. **2 pp; 88:790**

Were the Romans First to Place Concrete Underwater?: Archaeologists diving in the harbor at Caesarea, Israel, have found massive examples of Roman underwater concrete. Enough concrete and forms are left for them to describe the probable Roman techniques for building with concrete underwater. **2 pp; 88:54**

INFLATED FORMS

Bridge and Culverts Shotcreted over Inflated Forms: Closed-end cylindrical air bags offer many advantages: they can be used 40 to 50 times; they are easily transported and easily set up in different sizes and shapes; and they save time and money. **4 pp; 88:385**

Earth-sheltered Residences Built over Inflated Forms: The dome or arch shape requires only 4 inches of wall thickness to support earth cover. An umbrella of insulation over the earth increases the house's thermal mass. **3 pp; 88:399**

Formwork: A Big Balloon: Designing and making inflatable forms. Material requirements, handling and inflating the forms at the jobsite, and the hazards of wind are discussed. **2 pp; 88:403**

Inflated Forming for 50-foot Shells without Steel: A new low-cost method of building shells is being developed at the University of Delaware. Layers of polypropylene fabric sandwich a mix of dry concrete and perlite. The layers are inflated and then wet down. **2 pp; 88:405**

Inflated Forms for Chimney Lining: Dangerous old chimneys can be made stronger and safer with a new refractory mix of perlite, cement, and admixtures. **2 pp; 88:395**

Inflated Forms: Why and How?: An overview of what's possible with inflated forms. **1 p; 88:382**

Post-tensioned Dome Shotcreted from Outside an Inflated Form: This patented construction system can be used to build domes up to 188 feet in diameter. **1 p; 88:389**

Rebar and Fresh Concrete Lifted and Shaped by Inflating Form: Drawings show patented method for using low air pressure to lift and shape all the concrete and steel needed to contain an entire gymnasium. **1 p; 88:407**

Shotcrete and Urethane Layered Inside Inflated Form: The new technology of stratiform domes offers outstanding energy efficiency, strength, and design flexibility. The construction sequence is shown. **4 pp; 88:391**

JOINTS

Better Industrial Floors through Better Joints: Saw-cut joints filled with semi-rigid epoxy best meet requirements for joint performance. Metal keys, plastic crack-inducing strips, elastomeric joint fillers, and hard epoxies can cause problems. **4 pp; 88:749**

Construction Joints for Multistory Structures: Where joints are installed affects the cost, appearance, strength, and durability of a building. Article gives ACI requirements for construction joint location and clear instructions on how to form joints. **4 pp; 88:577**

Joint Filling: Investing in Your Floor's Future: Article describes how 400,000 lineal feet of concrete joints were filled in an auto assembly plant using 6,000 gallons of semi-rigid epoxy joint filler. **2 pp; 88:783**

LANDSCAPING

Grounds for Good Living: Landscaping offers a growth market for the concrete contractor as well as the precaster. Photos of landscaping and finishes. **4 pp; 88:848**

MANAGEMENT

Choosing and Paying a Specialty Contractor: Prequalifying specialty contractors and paying them using the time-and-materials contract method usually results in a satisfied contractor and a job well done. **2 pp; 88:870**

Estimating, Scheduling, and Cost Control: By breaking down previous jobs into work items, you can accurately estimate time, cost, and labor for new jobs having the same work items. Use work item data to schedule the job and to control costs. **3 pp; 88:170**

Matching Estimated and Actual Project Costs: Article describes how to control costs as the job progresses to ensure a profit. Shows how a computer can help. **2 pp; 88:27**

Mediation Keeps You Out of Court: Mediation is faster and cheaper than litigation when it comes to solving construction disputes. It also keeps business relationships and reputations intact. **2 pp; 88:190**

Negotiated Work Brings Contractors and Owners Together: A 15-point table in this article contrasts bidding and negotiating. **3 pp; 88:590**

Success Goes Beyond Sales and Profits: Learn how managing debt and cash flow influences whether or not your firm will be successful. Restructuring debt and managing inventory and accounts receivable turnover helps. **5 pp; 88:38**

Test Your Knowledge of Subcontract Terms: A quiz shows how subcontracting contracts can be misused and misunderstood. **2 pp; 88:200**

Using Breakeven Analysis to Manage Costs and Make Pricing Decisions: How to use fixed costs, variable costs, and sales data to make pricing decisions. **2 pp; 88:180**

What to Do When the Sky Starts Falling: Ten steps in planning for crises are listed here. Among them are: organize a team, prepare your plan, train your spokespersons and field supervisors, perform systematic crisis planning, and keep the plan up to date and accessible. **2 pp; 88:204**

Your Buy-sell Agreement: The 10 areas of potential conflict in a buy-sell agreement are explained: specific value, date of value, triggering event, limiting ownership, majority/minority shareholder clause, dispute clause, terms and conditions, trusted agreement, noncompete clause, gift to heirs. **2 pp; 88:866**

MARKETING

Concrete Basements: An Upgrade That Never Goes Out of Style: A full basement offers two of the features home buyers most want: lots of storage space and adaptable rooms. And a concrete basement offers more advantages than other kinds of basements. Tips for selling buyers and builders on the good points of a concrete basement. **3 pp; 88:467**

Escaping the High Cost of Temporary Pavement Repairs: Bond issues for concrete pavements keep maintenance costs low. **1 p; 88:501**

How to Exploit the Concrete Parking Lot Advantage: Selling the best product takes more than just having the best product. A contractor tells how he finds jobs and gets the bid. **3 pp; 88:459**

Marketing Your Subcontracting Services: How to be placed on bid lists, make negotiated presentations to prospects, and ask for jobs. **3 pp; 88:184**

OVERLAYS

High Early Strength Latex Modified Concrete: It's practical to accelerate LMC overlay construction by using Type III cement and a higher cement content. A Virginia bridge was back in use 24 hours after placement. **4 pp; 88:831**

Predicting Plastic Shrinkage Cracking in LMC Overlays: When weather conditions cause the evaporation rate to exceed 0.1 pound/square foot/hour for an LMC overlay, the contractor must take special precautions. **2 pp; 88:672**

PARKING LOTS

How to Build Concrete Parking Lots: Information from ACI's *Guide for Design and Construction of Concrete Parking Lots* (1987). Using concrete instead of asphalt is economical but requires special attention to design. **3 pp; 88:663**

PAVING

The Real Cost of Conservatism: The American Concrete Pavement Association has designed computer software for engineers, technicians, and contractors to use when they are designing concrete pavements. **2 pp; 88:1092**

POST-TENSIONING

Unbonded Single Strand Post-tensioning Tendon Details: Problems with single strand tendons can be easily and inexpensively avoided by proper attention to details. Use extruded seamless sheathing, correct installation, enough concrete cover, and good anchorage details. In the most aggressive environments electrical isolation of tendons may be needed. **2 pp; 88:668**

PRECASTING

Curved Beams Precast on Site: Specialists in cast-in-place work decided that for safety and economy they should site precast the curved beams for a parking structure. The general contractor and the structural engineer modified the original plan at the forming contractor's request. **2 pp; 88:921**

Olympic Oval—An Award-winning Use of Precast Concrete: Describes unique roof system of the Olympic Oval in Calgary, Alberta, Canada. Diagonally intersecting precast concrete arches support the low-profile roof. **2 pp; 88:778**

PROBLEM CLINIC

Problem Clinic: January 1988 **(2 pp; 88:34)**
- Avoid Butt Joints Between Form Liners
- Shorter Cylinders Have Higher Strengths
- Do Ribbed Form Liners Limit Aggregate Size?

Problem Clinic: February 1988 **(5 pp; 88:212)**
- Preventing Rust Stains
- Do Expanded Metal Bulkheads Cause Corrosion Problems?
- Exposed Aggregate for Tilt-up
- Is Epoxy Coating Needed for Rebar in Latex Modified Concrete?
- What Is a Megapascal?

Problem Clinic: March 1988 **(3 pp; 88:348)**
- Tilt-up Uses *Trompe L'Oeil*
- Cracks in the Curing Membrane
- Rained-on Slab May Not Require Repair
- Source for Predrilled, Unframed Plywood Form Panels

Problem Clinic: April 1988 **(1 p; 88:420)**
- When to Test for Chloride Ion?

Problem Clinic: May 1988 **(2 pp; 88:510)**
- Curled Topping

Problem Clinic: June 1988 **(4 pp; 88:606)**
- Freeze-thaw Durability of Shotcrete
- Roller-compacted Street Pavements
- Where to Buy Pavement Breaker

Problem Clinic: July 1988 **(3 pp; 88:695)**
- When to Grind a Defective Surface
- Elongated Slabs Are Likely to Crack
- Reduce Cover with Silica-fume Concrete
- Test for Presence of Fly Ash
- Computer-aided Formwork Design

Problem Clinic: August 1988 **(4 pp; 88:786)**
- Measuring Moisture in Slabs
- Pea Gravel Concrete Properties
- Spalls Caused by Powder-actuated Fasteners
- Information about Radiant Heating Systems

Problem Clinic: September 1988 **(2 pp: 88:873)**
- Will Low pH Wastewater Attack Concrete?

Problem Clinic: October 1988 **(3 pp; 88:950)**
- Reinforcing Steel Specified at 72,500 psi
- What Do Compressive Strength Results on Cement Mill Test Reports Tell You?
- Modulus of Elasticity Measures Stiffness
- Don't Push the Limits When Specifying Joint Spacing

Problem Clinic: November 1988 **(2 pp; 88:1038)**
- Color Differences in Formed Concrete Surfaces
- Cause for Peeling of Urethane Coating

Problem Clinic: December 1988 **(2 pp; 88:1096)**
- Patching Board-finished Concrete
- Flake Calcium Chloride Added Directly to Concrete

PUMPING

Ball-valve Concrete Pumps: How the ball-valve pump works, its drive mechanisms, efficiency, and safety. The advantages and disadvantages of ball-valve pumps. **3 pp; 88:145**

Frequent Flyer Program for Concrete Booms: How contractors used detachable truck-mounted placing booms to save money and time on the job. **3 pp; 88:582**

(more)

Pumping Lightweight Concrete 42 Stories: The contractor had special problems to solve on this job. He had to work with three 90° turns in the pumpline, an unusual lightweight mix, and a tricky system layout. Planning made the difficult job run smoothly. **4 pp; 88:492**

REBAR CORROSION

How Do You Prevent Corrosion?: Ways of slowing or stopping rebar corrosion are: reducing concrete permeability; ensuring proper cover; using nonchloride accelerators; applying sealers or overlays of polymer, latex-modified, silica-fume, and low-slump concrete; using epoxy-coated or galvanized rebars; adding a corrosion-inhibiting admixture; or using rebars made of noncorroding material. **6 pp; 88:110**

RECYCLED CONCRETE

Recycling Concrete Pavements: The Michigan Department of Transportation has recycled more than 400 lane-miles of concrete pavement. An MDOT engineer talks about the department's experience in breaking, crushing, using recycled materials, and paving. **4 pp; 88:320**

RECYCLING RETURNED CONCRETE

Chemical System Puts Hydration on Hold for Hours or Even Days: A two-component chemical system administered by the truck driver first prevents returned concrete from setting and then reactivates the cement when it's wanted. System eliminates washwater waste. **3 pp; 88:502**

REINFORCEMENT

Pavement Dowel Placement Made Easy: Article describes mechanized system for placing dowels for concrete pavement patching using an epoxy dispensing machine and a multiple-bit hydraulic drill on a backhoe. **2 pp; 88:198**

Preheating Reinforcing Bars and Insert Plates: Get chemical composition data for rebar if you need to weld insert plates to rebar. Amount of required preheating depends on the carbon equivalent (C.E.). **2 pp; 88:1077**

Reinforcing Concrete with Polymer Grids: Polymer grids are an alternative to steel mesh used for crack control. Because they don't corrode, the grids can be placed where they'll do the most good—closer to the surface. **2 pp; 88:776**

REPAIR

Down the Hole: Using shotcrete to repair reinforced concrete walls is a challenge because of limited access and tight working conditions. Describes surface preparation and how to ensure worker safety. **2 pp; 88:18**

Fragile Face-lift: An industrial crane was used to solve safety, time, and space problems at a coastal condominium in California. Almost 400 balustrades were removed and the balconies repaired. **2 pp; 88:699**

If It's Still Standing, It Can Be Repaired: Preplaced aggregate concrete is useful as a repair material because it bonds well with the old concrete but shrinks very little. The authors explain how to use preplaced aggregate concrete for long-lasting repairs. **5 pp: 88:643**

Repairing Concrete Parking Structures: A restoration specialist can describe observed parking structure distress, identify causes of deterioration, and determine distress severity and repair costs. The article describes the five approaches to restoring conventionally reinforced floor slabs: spot patch and seal, spot patch and traffic topping, bonded concrete overlay, full depth slab replacement, and cathodic protection. **6 pp; 88:97**

Shear Collars Save a Parking Garage Slab: Extreme distress of a parking garage slab indicated possible structural failure. Improperly placed rebar had caused serious overloading at slab-column junctions. Shear collars were installed to transfer the load to columns. **3 pp; 88:924**

Structural Rehabilitation of Concrete Lighthouse: 70-year-old Brandywine Shoal Lighthouse was repaired using tremie concrete, shotcrete, precast members, and cast-in-place concrete. **3 pp; 88:659**

Wet Shotcreting Machine Gives Nozzleman Total Control: A wet-mix shotcrete machine designed for repair work lets the nozzleman start or stop shooting. The machine mixing chamber is a pressure vessel connected to a small air compressor. Diagram of machine included. **3 pp; 88:330**

RESIDENTIAL

The Concrete Driveway: A good concrete driveway is a continuing part of a property's curb appeal and a highly visible, ongoing testimonial to the contractor who installed it. The requirements for a good job, upgrades, and a deicer warning are given. **2 pp; 88:858**

Desert Home in Exposed Aggregate Concrete: The owner wanted a concrete house for beauty, to complement his desert site, and to provide protection against fire. **3 pp; 88:1024**

Forming Impressions in an All-concrete Bathroom: Cast-in-place concrete walls, ceiling, floors, tub, shower, shelves, and even the toilet paper holder make this bathroom easy to clean. **1 p; 88:953**

Geodesic Dome of Polystyrene and Concrete: Save Money, Space, and Energy: Foundation requirements, cutting and assembling the triangular panels for a geodesic dome, setting steel and applying concrete, and costs and material quantities are detailed. **4 pp; 88:1018**

Grass + Concrete = Load-bearing Lawn: Because grass-filled concrete drains about as well as ordinary grass, it can qualify as both parking area and pervious green space in zoning formulas. It's useful for parking lots and driveways, emergency vehicle access roads, and erosion control and stabilization for water-related projects. **3 pp; 88:863**

Recurring Residential Concrete Problems: The most frequent causes of concrete call-backs are slow pours, rapid surface drying, lack of cold weather curing, and jointing errors. Ways to avoid these errors are described. **4 pp; 88:770**

Usonian Automatic: Wright's Concrete Masonry: The focal point of a traveling show called "Frank Lloyd Wright: In the Realm of Ideas" is the replica of an 1,800-square-foot masonry house. Wright designed it as a low-cost example of modular construction. **3 pp; 88:1028**

ROOF DECKS

Tips on Roofing Concrete Roof Decks: When you put a roofing system on a low-slope roof, you have to choose among four types of vapor retarders, nine types of roof insulation, eight general types of roof membranes, and three ways of installing the membranes. The author suggests points to consider and describes the eight types of roof membranes. **4 pp; 88:160**

ROLLER COMPACTED CONCRETE

Roller Compacted Concrete Pavements: Article describes how roller compacted concrete can be used for road construction. Field experience is discussed and suggestions for construction are given. **3 pp; 88:13**

SAFETY

Booms and Power Lines: A Deadly Combination: Following the Occupational Safety and Health Administration's regulations for safe clearance saves lives. **3 pp; 88:416**

OSHA Revises Concrete Construction Safety Rules: Major changes in the Occupational Safety and Health Act (OSHA) for concrete and masonry are described. The new regulations are reproduced at the end of the article. **5 pp; 88:1079**

Reduce Back Injuries by Lifting Correctly: Common back disorders are most likely caused by improper lifting over a period of time. Article lists good and bad practices. **1 p; 88:949**

Worker Safety in Formwork Operations: Erecting and removing formwork exposes workers to the hazards of falling, being hit by falling objects, and lifting improperly. During deck forming, workers should work from ladders or rolling scaffolds instead of from the stringers. To eliminate falls from twisted 4x4 runners, keep plywood or a plank runway close to the point where 4x4s are being placed. The most important keys to accident-free jobs are jobsite supervision and experienced formworkers. **5 pp; 88:303**

SAWING

Saw Cuts Concrete Immediately after Finishing: A 24-pound saw with a 5-inch-diameter diamond blade cuts joints in newly placed concrete without marring the surface. The operator can stand up to 30 feet away. **2 pp; 88:336**

SCULPTURE

Concrete Jungle: A 4.5-acre concrete tropical landscape was cast and sculpted in less than 7 months for a Puerto Rican hotel. It encompasses the world's longest fresh water swimming pool. **1 p; 88:693**

Precast Concrete as an Art Medium: Artist Michael Wolk's concrete sculpture *Living Room Suite* is a 6-ton, larger-than-life grouping of precast concrete furniture in Miami, Florida. **1 p; 88:876**

SLABJACKING

Slabjacking Solutions for Settled Slabs: Raising a concrete slab is faster and much less costly than replacing it. Grout mixtures, equipment requirements, procedures, and problem areas are discussed. Many photos and diagrams included. **4 pp; 88:651**

SUBGRADE PREPARATION

Basics of Subgrade Preparation for Industrial Floors: Article tells how to identify unsuitable soils, improve the subgrade soil, inspect subgrade preparation methods, control subgrade elevation, and deal with compaction problems immediately. **3 pp; 88:137**

TESTING

Detecting Invisible Corrosion in Concrete: Computer-aided half-cell equipment allows a nondamaging and effective test for active but invisible rebar corrosion. **3 pp; 38:757**

Interpreting Test Reports: Look Above the Bottom Line: Cylinder strength isn't the whole story. The reported information and the way it's reported also help you evaluate the concrete and the quality of sampling and testing. **3 pp; 88:939**

Taking the Pulse of a Structure: Describes how modal analysis can be used to measure dynamic characteristics of a concrete structure—how it responds to induced or ambient vibrations. **1 p; 88:48**

TILT-UP

Big Building Blocks: Florida firm saves its clients money by combining modular design, tilt-up construction, and standardized details. Construction costs are cut by 20% and design time by 15%. **2 pp; 88:508**

Mini Storage Warehouse Uses Mega Tilt-up Panels: Stack casting panels and careful planning were needed to leave room for the crane to work without disturbing temporary braces when a four-story warehouse was being built in a small area. **3 pp; 88:765**

Tilt-up Offers the Competitive Advantage: Tilt-up construction offers advantages of economy, speed, design freedom, security, and use of local materials. New developments in technique have let the tilt-up industry take a larger market share. **3 pp; 88:475**

TOOLS

Laser Leveling: A One-man Show: Using a laser system is faster than optical grade leveling and requires fewer workers. Article explains how the system works: transmitters, power sources, and receivers; accuracy and tolerances; how to check calibration; costs. **3 pp; 88:1015**

TRANSPORTATION

Transportation Monies Must Be Used for Transportation: Editorial explaining why $14 billion in the Highway Trust Fund should be spent and why it isn't being spent on developing transportation systems. **1 p; 88:605**

TRANSPORTING CONCRETE

Can Concrete Fly?: A helicopter brought buckets of fresh concrete to a hard-to-reach mountain site in Colorado, but the downdraft from the rotor blades caused special problems for the workers. Forms must be strongly constructed, loose materials secured, the ground wet down to minimize flying dust. If wind moves the buckets into the forms, be prepared to repair or realign forms. **2 pp; 88:299**

VIBRATION

Concrete Vibration: Vibration increases concrete strength by driving out entrapped air. Article tells how vibration consolidates concrete and how to use an internal vibrator. **4 pp; 88:563**

WATERPROOFING

Polyurethane Injection Stops Water Tunnel Leaking: Inadequate concrete consolidation allowed a 125-gallon-per-minute leak in a concrete conduit. The Bureau of Reclamation stopped the leak by injecting hydrophilic polyurethane resin. **2 pp; 88:1073**

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